

CERVICAL EPIDURAL HAEMATOMA WITH CLIVUS FRACTURE

Case report

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ABSTRACT - Clivus fractures are rare and severe entities, usually associated with vascular or cranial nerve lesions and frequently diagnosed postmortem. Cervical epidural haematomas can be traumatic or spontaneous, manifested in acute or chronic form, and are treated surgically in the majority of cases, although the conservative treatment also can be indicated to patients with incomplete and non-progressive deficits. The authors report the case of a female patient, 8 years old, victim of trampling in public way by a high velocity motorized vehicle, admitted in Glasgow 7, anisocoric pupils (left pupil midriatic), whose radiological investigation showed a transverse fracture of the clivus, cervical epidural haematoma and diffuse axonal injury. The patient was submitted to intracranial pressure monitorization, sedation and conservative treatment with dexamethasone, with good outcome. The authors also present a literature review.

KEY WORDS: epidural haematoma, clivus fracture, pediatric trauma.

Hematoma cervical epidural com fratura de clivus: relato de caso

RESUMO - As fraturas de clivus são entidades raras e graves, usualmente associadas a lesões vasculares ou de nervos cranianos, sendo freqüentemente diagnosticadas *postmortem*. Hematomas epidurais cervicais podem ser traumáticos ou espontâneos, manifestos de forma aguda ou crônica, requerendo tratamento cirúrgico na maior parte das vezes, embora o tratamento conservador possa ser indicado a pacientes com déficits incompletos ou não progressivos. Os autores relatam o caso de uma paciente do sexo feminino, 8 anos, vítima de atropelamento em via pública por veículo automotor em alta velocidade, que foi admitida em Glasgow 7, com anisocoria (pupila esquerda midriática). A investigação radiológica evidenciou fratura transversa de clivus, hematoma epidural cervical e lesão axonal difusa. A paciente foi submetida a monitorização da pressão intracraniana, sedação e tratamento conservador com corticoesteróides, com boa evolução. Os autores apresentam também uma revisão da literatura pertinente.

PALAVRAS-CHAVE: hematoma epidural, fratura de clivus, trauma pediátrico.

Clivus fractures are rare entities and are usually associated with vascular or cranial nerve lesions¹⁻⁵. They are frequently diagnosed postmortem⁴ and can be classified radiologically on: longitudinal, transverse or oblique fractures.

Cervical epidural haematoma can be traumatic or spontaneous; the last is associated with high blood pressure, vascular malformations, blood dyscrasias, use of medication, tumors, spinal taps⁶⁻¹⁶. They can be manifested in acute⁶⁻¹⁶, or chronic¹⁴ form, and are treated surgically in the majority of cases, although the conservative treatment also can be indicated

to patients with incomplete and non-progressive deficits^{6,9}.

There is no report in the reviewed literature observing the association of cervical epidural haematomas and clival fractures.

CASE

A 8 years old girl victim of trampling in public way by a high velocity motorized vehicle, was brought to the emergency room of Hospital São Paulo (EPM-UNIFESP) 8 minutes after the accident. In the admission the patient had a patent airway, with cervical spine immobilized, breathing on her own

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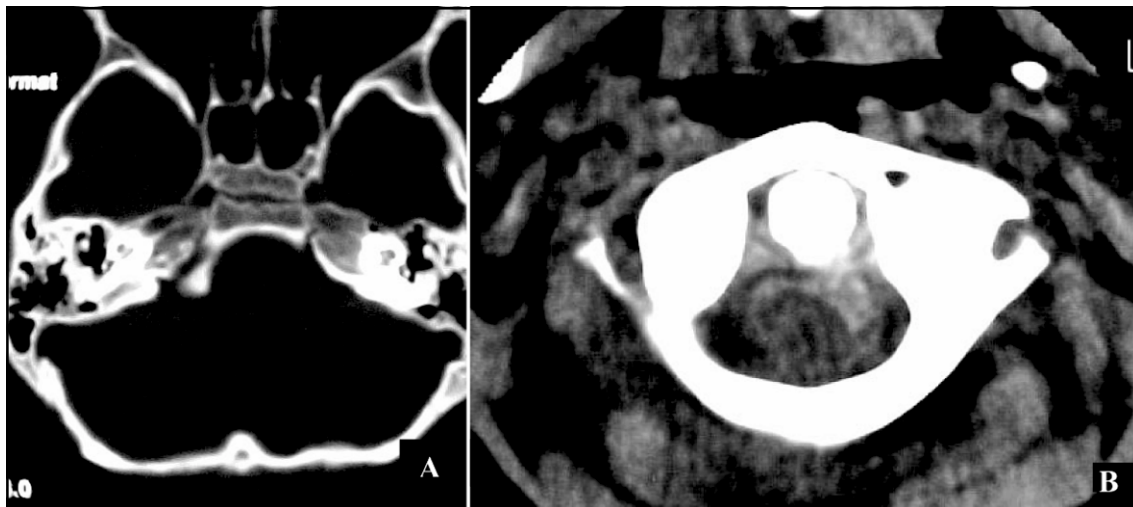


Fig 1 A. CT scan (bone window) transverse clival fracture. B. CT scan cervical spine haematoma at C1-C2.

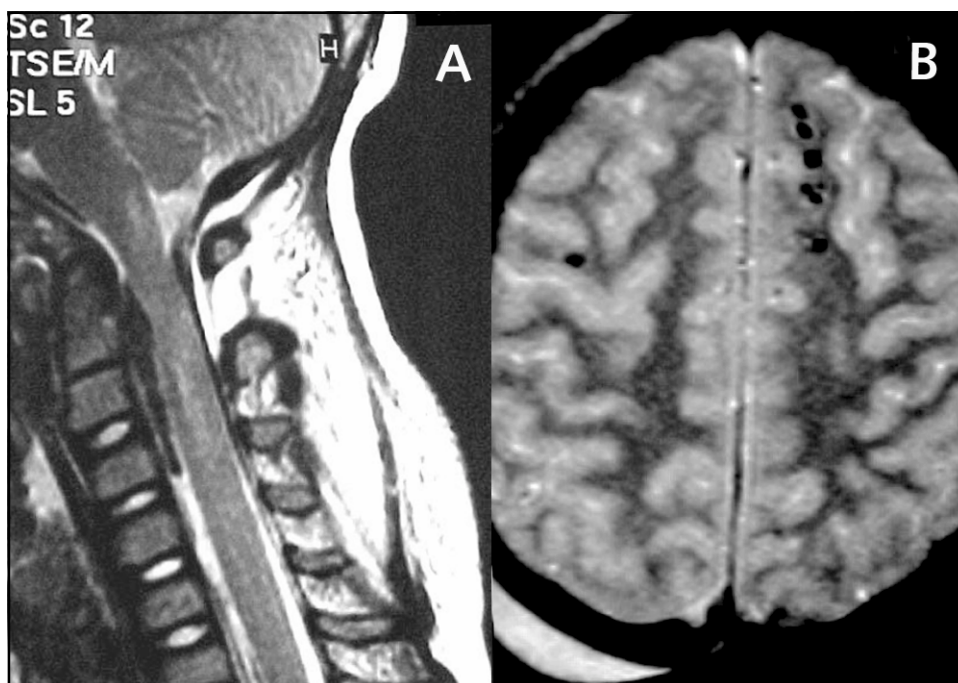


Fig 2 A. MRI of cervical spine (FFE), (sagittal acquisition) showing cervical epidural haematoma extending from C1 to C3. B. MRI of the brain showing diffuse axonal injury in the two hemispheres.

(respiratory frequency 20), hemodinamically stable (blood pressure 100x60 mm Hg and cardiac frequency 120 bpm), with active bleeding on her left inferior limb (tibial fracture diagnosed latter on). She presented a flacid abdomen, voluntary rectal sphincter contraction and presence of fecal material to palpation, without signs of bleeding.

The neurological exam evidenced ocular opening to painful stimulus, with left members withdrawal to this stimuli, showing hemiparesis grade I in the right side and absence of verbal response (Glasgow Coma Scale = 7); the pupils were anisocoric, with midriatic left pupil.

Chest and pelvis X-rays were normal. The cranial and

cervical computed tomography showed transverse fracture of the clivus (Fig 1 A) and anterior cervical epidural haematoma (Fig 1 B), which extended from the first to the third cervical vertebrae. Cervical MRI showed anterior cervical epidural haematoma (Fig 2 A), extending from C1 to C3 and exerting some mass effect over the spinal cord. Cranial MRI showed diffuse axonal lesions (Fig 2B). Intracranial pressure was measured by a fiber-optic catheter, placed on the right ventricle, and the patient was monitored at the pediatric intensive care unit. The patient was also submitted to continuous monitorization of O₂ extraction by a catheter placed in the right jugular vein.

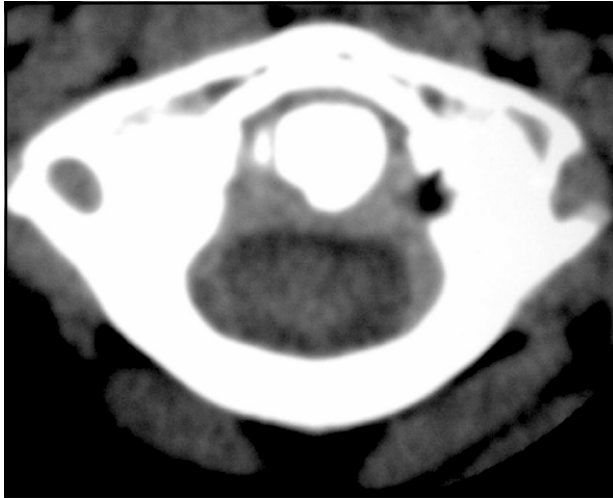


Fig 3. CT SCAN of cervical spine (follow up) showing resolution of haematoma.

The patient was treated with dexamethasone and on mechanical ventilation under sedation for five days. The sedation was suspended for brief periods daily and the patient examined again; no progression of deficits was confirmed. After five days, since the ICP and O₂ extraction were within normal limits and CT scan showed no progression of haematoma, the sedation was suspended and the patient allowed to wake up. The first neurological examination after the sedation was suspended completely showed right hemiparesis, with evident increase of muscular strength (GIII on arm and IV on the limb), and left pupil bigger than the right one. The follow up after three months showed a discrete right hemiparesis (grade IV+) and dyscoric pupils (left pupil 4 mm, right 3mm), with return to normal activities.

CT scan was performed and showed spontaneous resolution of the haematoma (Fig 3)

DISCUSSION

The clivus is considered as the strongest bone of the skull base⁴; it develops due to the fusion of the body of the sphenoid bone to the basilar portion of the occipital, and remains separated until ages higher than 12 years old by the spheno-occipital synchondrosis.

The spheno-occipital synchondrosis is the main growing center of the skull base after birth. Its growing allows the elongation of the medial portion of the skull base.

The arterial supply of the clivus is made cranially by the meningo-hypophyseal trunk and caudally by the posterior meningeal artery, anastomosed with the lateral clival artery¹⁷.

Its deep localization, together with the anatomical center of the skull base protected by the facial structures, bone of the medial fosse and occipitium, makes

the site infrequent to fractures^{2,3}. The diagnosis is difficult by the imaging superposition in the x-ray and is usually described *post-mortem*^{2,4}. There are not large series and since this condition is probably underestimated, more complete information about the distribution of clival fractures on the pediatric population is not available.

The mechanical forces responsible for the fracture are still under continuous controversy, but there had been described vertical², lateral² and anterior-posterior forces^{2,5,18} involved in these fractures. Radiologically, the clivus fractures can be classified as longitudinal, transverse and oblique^{2,18}.

The longitudinal fractures (37,5%) extend from the *dorsum sellae* to the anterior region of the magnum foramen, causing vascular lesions such as occlusion of the vertebral or basilar arteries, forming traumatic aneurysms of the PICA^{1,2,3,5,18}. The transverse fractures (37,5%) are close to the spheno-occipital synchondrosis region and to the *dorsum sellae*, usually extend from one carotid foramen to the other, associated with lesions of the internal carotid artery, carotid-cavernous fistula, cranial nerve lesions (usually VI and VII cranial nerves) and CSF fistulas^{4,19}.

The oblique fractures (29,4%) initiate at the lateral region of the *dorsum sellae*, ending at the contralateral petroclival fissure, and manifests by vascular lesions of the internal carotid artery, cranial nerve lesions (like Collet-Sicard syndrome) and by CSF fistulas^{2,19}.

Petrous bone fractures, Horner syndrome and insipidus diabetes also were associated to the transverse and oblique clivus fracture^{2,4}.

In the presented case the follow-up is too short (three months) to determine if there is any compromising of the skull base development. However, since the synchondrosis only bound around 15 years old, hypothetically it's possible to occur growth alterations in the skull base due to fracture/rupture of the spheno-occipital suture.

Cervical epidural haematoma is a very rare entity, and its etiology is divided in traumatic and spontaneous⁶⁻¹⁶. Its incidence after cervical trauma was estimated to be 1.7%.

The spontaneous cases can be secondary to pregnancy, blood dyscrasias, hypertension, vasculitis, vascular malformations or tumors^{11,12,15}. The traumatic ones can originate from vertebral fractures, obstetric traumas, postoperative bleeding, epidural anesthesia, penetrating trauma or even due to trauma with small impacts^{6,8,9,13,14,16}.

Nine to 50% of cervical epidural haematomas have traumatic origin, but they can occur without fractures in up to 50% of cases⁸. It is described in 0.5% to 7.5% of vertebral fractures⁹. The association of clival fracture and cervical epidural haematoma has not been described yet. The authors postulate that the haematoma may have its origin from the epidural venous plexus, oozing from the fracture itself or from a laceration of the arterial supply of the clivus.

Clinically they manifest by myelo or radiculopathies, as an acute form more frequently^{6,11-13,15,16}, although they can have a chronic appearance¹⁴. They seem to have origin in venous blood from the epidural plexus^{6,9,16}, although there is one description associated with arterial bleeding¹⁰.

Cervical epidural haematomas are usually located on the dorsal region, although there is a case described with anterior localization, associated with fracture of C7-T1 joint, making this the second case of epidural cervical haematoma localized at the ventral region⁹.

The treatment still remains controversial. If we consider that there is only one case described in the literature, it becomes evident the absence of protocol or guidelines to treat such cases.

Crabbe et al.⁶ described one case of cervical epidural haematoma treated clinically with the use of corticoids with good recovery. Other authors^{8,11-14,16} defend surgical intervention by laminectomy at the levels that correspond to the haematoma as mandatory treatment.

Lefranc et al.⁹ described a case of cervical epidural haematoma localized at the anterior region treated by clinical means with a good outcome.

In the presented case, the patient was submitted to clinical treatment with the use of dexamethasone since there was only a slight medullar compression. Clinical follow-up with adequate monitorization and daily neurological check up, with the aid of radiological control was assured. The outcome was favorable.

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